What is claimed is:

1. A method for forming micro-tubular polymeric materials, the method comprising the steps of:

mixing a polymer with a liquid to form a composition, the composition being at a temperature;

changing the temperature to cause phase separation of the composition with a directional temperature gradient; and then

removing an unnecessary phase, thereby forming micro-tubular, porous polymeric materials having a predetermined, oriented architecture uniformly throughout the materials.

2. The method as defined in claim 1 wherein the architecture is adapted to guide at least one of cell seeding, cell distribution, and new tissue formation *in vitro* or *in vivo*, via geometrical cues from the micro-tubular architecture in three dimensions.

3. The method as defined in claim 1, further comprising the steps of:

seeding cells on the micro-tubular materials to form micro-tubular material/cell constructs; and

culturing the material/cell constructs.

4. The method as defined in claim 3 wherein the architecture is adapted to guide at least one of the cell seeding, cell distribution, and new tissue formation *in vitro* or *in vivo*, via geometrical cues from the micro-tubular architecture in three dimensions.

5. The method as defined in claim 3 wherein the culturing takes place *in vitro* within a predetermined tissue culture medium.

6. The method as defined in claim 3 wherein the culturing takes place *in vivo*.

7. The method as defined in claim 1 wherein the temperature gradient is uni-directional.

8. The method as defined in claim 1 wherein the polymer is chosen from at least one of natural or synthetic hydrophilic polymers, natural or synthetic hydrophobic polymers, natural or synthetic amphophilic polymers, degradable polymers, non-degradable polymers, partially degradable polymers, and mixtures thereof.

9. The method as defined in claim 8 wherein the polymer is selected from at least one of poly(lactide) (PLA), polyglycolic acid (PGA), poly(lactide-co-glycolide) (PLGA), polyanhydrides, poly(ortho esters), and mixtures thereof.

10. The method as defined in claim 8 wherein the polymer is a water soluble (hydrophilic) polymer selected from at least one of polyacrylic acid, polyvinyl alcohol, polyethylene oxide, polyethylene glycol, polymethacrylic acid (PMAA), alginate, collagen, gelatin, hyaluronic acid, and mixtures thereof.

11. The method as defined in claim 8 wherein the polymer is a water insoluble (hydrophobic) polymer selected from at least one of poly(methyl methacrylate) (PMMA), polycarbonate, polypropylene oxide (PPO), polyamides, polyvinylidene fluoride (PVDF), polybutylene, polyacrylonitrile, and mixtures thereof.

12. The method as defined in claim 8 wherein the polymer is a degradable polymer selected from at least one of polyamino acids, engineered artificial proteins, natural proteins, and biopolymers.

13. The method as defined in claim 9 wherein the polymer is at least one of poly(L-lactic acid) (PLLA) and poly(D,L-lactic acid-co-glycolic acid) (PLGA).

14. The method as defined in claim 1 wherein the liquid is at least one of a solvent, a mixture of solvents, a mixture of a solvent and a non-solvent, a mixture of solvents and non-solvents, and mixtures thereof.

15. The method as defined in claim 14 wherein the liquid is at least one of acetic acid, acetone, benzene, benzyl alcohol, butyl acetate, n-butyl alcohol, carbon dioxide, carbon tetrachloride, cresol, chlorobenzene, chloroform, cyclohexane, cyclohexanone, dichloroethylene, dimethylformamide (DMF), dioxane, ethyl acetate, ethyl alcohol, ethyl ether, formic acid, heptane, hexane, methanol, methylene chloride, methyl ethyl ketone, octane, propyl alcohol, pyridine, tetrahydrofuran (THF), tetralin, toluene, trifluoroacetic acid, trifluoroethanol, water, xylene.

16. The method as defined in claim 13 wherein the liquid is a solvent selected from at least one of benzene, dioxane, and mixtures thereof.

17. The method as defined in claim 1 wherein the unnecessary phase is removed by at least one of sublimation, liquid exchange, drying, and a combination thereof.

18. The method as defined in claim 1 wherein the phase separation temperature ranges between about -196°C and about 25°C.

19. The method as defined in claim 16 wherein the phase separation temperature ranges between about -70°C and about 0°C.

20. A micro-tubular polymeric composition formed by the method of claim 1.

21. The composition as defined in claim 20, further comprising cells seeded on the micro-tubular materials, thereby forming micro-tubular material/cell constructs.